CLAIMS

1. A method for configuring a communication network including a plurality (N) of antennas (14), characterised in that it comprises the steps of:

- a) including in said plurality of antennas (14) at least one (n) reconfigurable antenna adapted to serve communication traffic in a respective coverage area (S, P), said reconfigurable antenna having a radiation diagram exhibiting a plurality of selectively adjustable gain values for a set of directions ($\Delta\theta_i$, $\Delta\varphi_j$), each direction in said set defining a propagation path between the antenna (14) and a portion (S, P) of said coverage area,

- b) determining, for each direction ($\Delta\theta_i$, $\Delta\varphi_j$) in said set, at least one value of communication traffic (T_{pixel}) and at least one attenuation value (a_{pixel}) over said propagation path, and

- c) selectively and independently allotting to each direction in said set ($\Delta\theta_i$, $\Delta\varphi_j$) a respective gain value in the radiation diagram of said reconfigurable antenna as a function of said at least one of said traffic value (T_{pixel}) and of said attenuation value (a_{pixel}) determined for said direction.

2. The method of claim 1, characterised in that said gain value for each said direction is allotted as the gain maximising a ratio ($R_{bcpixel}$) of said traffic value to said attenuation value.

3. The method of claim 1, characterised in that said gain value for each said direction is allotted as the gain optimising a cost function ($f(a_0)$) wherein said traffic value and said attenuation value represent benefit and cost factors, respectively.

4. The method of claim 1, characterised in that it includes the steps of:

- subdividing said coverage area of said at least one reconfigurable antenna in a plurality of portions (S) each including a plurality of pixels (P), wherein each said pixel has an associated value of communication traffic (T_{pixel}) and a propagation path from said antenna (14) with an associated attenuation value (a_{pixel}), whereby each said pixel has an associated benefit/cost ratio (R_{bc}) being the ratio of said associated communication traffic value (T_{pixel}) to said associated attenuation value (a_{pixel}),

- defining an optimisation function for all the pixels (P) within a given portion (S) depending on said benefit/cost ratio for the pixels (P) in said portion (S),

- allotting to the direction in said radiation diagram identifying each said portion (S) a respective gain value optimising said optimisation function.

5. The method of claim 4, characterised in that, each said pixel having associated a given value of attenuation and a_{min} being the minimum value of the values of attenuation for all the pixels in said given portion (S), said optimisation function is defined as

$$f(a_0) = (1/a_0)\sum T_{pixel}/a_{pixel}$$

where the summation extends for a_{pixel} from a_{min} to a_0 over all the pixels (P) in a given portion (S) of said coverage area, and T_{pixel}/a_{pixel} is said benefit/cost ratio.

6. The method of claim 1, characterised in that it includes the steps of:

- selecting said at least one reconfigurable antenna (14) as an antenna having a maximum gain value (G_{max}),

- determining for each direction in said set a respective attenuation value (a_{mi}) to be compensated by a respective gain value in said radiation diagram, said attenuation values having a maximum (A_{max}), and

- associating to said direction in said radiation diagram gain values based on the relationship:

- $G_{mi} = G_{max} - (A_{max} - a_{mi})$, wherein G_{max} is said maximum gain, A_{max} is said maximum of attenuation and a_{mi} is the attenuation value determined for the direction to which the gain G_{mi} is assigned.

7. The method of claim 1, characterised in that it includes the steps of:

- determining a field intensity value (E_{min}) required to provide said communication traffic over the area covered by the radiation diagram of said at least one reconfigurable antenna (14),

- determining a power value (P_{feed}) for said antenna (14) to provide said field value (E_{min}),

- comparing said power value determined (P_{feed}) with a maximum threshold value, and

- if said power value as determined (P_{feed}) exceeds said maximum threshold value, issuing a signal indicating that the antenna (14) is to be relocated.

8. The method of claim 1, characterised in that it includes the steps of:

- configuring said network as a step of planning a still undeployed network, and

- determining said respective value of communication traffic (T_{pixel}) as a planned parameter of said still undeployed network.

9. The method of claim 1, characterised in that it includes the steps of:

- configuring said network as a step of managing an already existing network, and

- determining said respective value of communication traffic (T_{pixel}) as at least one of a forecast parameter and a measured parameter of said already existing network.

10. A method for configuring a communication network including a plurality (N) of antennas (14) each serving a respective amount of traffic within a respective coverage area, characterised in that it comprises the steps of:

- determining a reference amount of traffic (T_m) served by said plurality (N) of antennas in the network,

- setting at least one difference threshold with respect to said reference amount of traffic (T_m),

- identifying among said plurality of antennas (N) a subset (n) of antennas, wherein the respective amounts of traffic served by the antennas in said subset reach said difference threshold, and

- configuring the antennas (n) in said subset as reconfigurable antennas, each having a radiation diagram exhibiting a plurality of selectively adjustable gain values for a set of directions ($\Delta\theta_i$, $\Delta\varphi_j$), each direction in said set defining a propagation path between the antenna (14) and a portion (S, P) of said coverage area, and

- applying to the reconfigurable antennas in said subset the steps b) and c) of claim 1 to reconfigure said network.

11. The method of claim 10, characterised in that it comprises the step of defining said reference amount of traffic as the average amount of traffic (T_m) served by said plurality of antennas.

12. The method of claim 10, characterised in that it comprises the step of checking (106; 208) the performance level of said reconfigured network.

13. The method of claim 12, characterised in that it comprises the steps of:

- defining at least one criterion for satisfactory performance level of said network,

- checking (106; 208) the performance level of said reconfigured network against said criterion, and

- if said checking (106; 208) reveals that said performance level fails to meet said criterion, taking at least one of the steps of:

  - varying (110; 212) said reference amount of traffic (T_m),

  - increasing the number (n) of said reconfigurable antennas in said subset, and

  - increasing (218) the total number (N) of antennas in the network.

14. A network architecture for a communication network including a plurality (N) of antennas (14), characterised in that it comprises:

- at least one (n) reconfigurable antenna adapted to serve communication traffic in a respective coverage area (S, P), wherein

  - said at least one reconfigurable antenna has a radiation diagram exhibiting a plurality of selectively adjustable gain values for a set of directions ($\Delta\theta_i$, $\Delta\varphi_j$), and wherein

  - each direction ($\Delta\theta_i$, $\Delta\varphi_j$) in said set

    - defines a propagation path between the antenna (14) and a portion (S, P) of said coverage area, and

    - has associated

      - at least one value of communication traffic (T_{pixel}) and at least one attenuation value (a_{pixel}) over said propagation path, and

      - a respective gain value for said radiation diagram which is a function of at

least one of said traffic value (T_{pixel}) and of said attenuation value (a_{pixel}).

15. The network architecture of claim 14, characterised in that said gain value for each said direction is the gain maximising a ratio ($R_{bcpixel}$) of said traffic value to said attenuation value.

16. The network architecture of claim 14, characterised in that said gain value for each said direction is the gain optimising a cost function ($f(a_0)$) wherein said traffic value and said attenuation value represent benefit and cost factors, respectively.

17. The network architecture of claim 14, characterised in that:

- said coverage area of said at least one reconfigurable antenna is subdivided in a plurality of portions (S) each including a plurality of pixels (P), wherein each said pixel has an associated value of communication traffic (T_{pixel}) and a propagation path from said antenna (14) with an associated attenuation value (a_{pixel}), whereby each said pixel has an associated benefit/cost ratio (R_{bc}) being the ratio of said associated communication traffic value (T_{pixel}) to said associated attenuation value (a_{pixel}),

- for all the pixels (P) within a given portion (S) an optimisation function exists depending on said benefit/cost ratio for the pixels (P) in said portion (S),

- said gain value for each said direction is the gain optimising said function.

18. The network architecture of claim 17, characterised in that, each said pixel having associated a given value of attenuation and a_{min} is the minimum value of the values of attenuation for all the pixels in said given portion (S), said optimisation function is defined as

$f(a_0) = (1/a_0) \sum T_{pixel}/a_{pixel}$

where the summation extends for a_{pixel} from a_{min} to a_0 over all the pixels (P) in a given portion (S) of said coverage area, wherein T_{pixel}/a_{pixel} is said benefit/cost ratio.

19. The network architecture of claim 14, characterised in that:

- said at least one reconfigurable antenna (14) is an antenna having a maximum gain value (G_{max}), and wherein for each direction in said set a respective attenuation value (a_{mi}) exists to be compensated by a respective gain value in said radiation diagram, said attenuation values having a maximum (A_{max}), and

- each said direction in said radiation diagram has an associated gain value G_{mi} based on the relationship:

- $G_{mi} = G_{max} - (A_{max} - a_{mi})$, wherein G_{max} is said maximum gain value, A_{max} is said maximum attenuation and a_{mi} is an attenuation value determined for the direction to which the gain value G_{mi} is assigned.

20. A computer program product loadable in the memory of at least one computer and including software code portions for performing the method of claims 1 to 13.